FABRIC FOR WELDING

FIELD OF THE INVENTION

The present invention relates to a fabric which can be attached by welding to a substrate.

BACKGROUND OF THE INVENTION

Heretofore in welding fabric to a substrate, the fabric used was a belt-form fabric with a special design. As shown in Figure 9A, at least a portion of the belt-form fabric is woven with a coarse weave. Figure 9B illustrates how this fabric T is welded to a substrate in the form of a sheet, S. The coarsely woven portion t is sandwiched between a welding tape M and substrate S and heat-pressed so that the welding tape is melted and flows into the gaps of the coarsely woven portion t. Thus, the fabric T is united with substrate S.

Unfortunately, the conventional fabrics used for welding require that the welding tape M be correctly positioned on the coarsely woven portion of the belt-form fabric T overlapped on the welding zone of the substrate S. This correct positioning is troublesome, and requires considerable expenditure of time and labor.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome the aforementioned deficiencies of the prior art.

It is another object of the present invention to provide a fabric for welding which can easily be welded to any

type of substrate that can be subjected to hot pressing.

According to the present invention, a fabric for welding is provided which has a welding portion integral with the fabric which extends partially or completely over the width of the fabric. The welding portion of the fabric comprises at least a warp or weft which melts under hot pressing to adhere the fabric to a substrate. The substrate may be a cloth sheet, a synthetic resin sheet, or the like. This enables one to attach the sheet to a column, a stake, a log, a building, a footing, etc., or to attach the welding fabric to another sheet.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a plan view showing a fabric for welding.

Fig. 2 is a sectional view showing how the fabric for welding in Figure 1 is welded to a sheet.

Fig. 3 A is a perspective view showing how the fabric can be welded to a substrate.

Fig. 3 B is another perspective view showing how the fabric can be welded to a substrate.

Fig. 4A is a perspective view showing another embodiment of fabric for welding according to the present invention.

Fig. 4B is another perspective view showing another embodiment of fabric for welding according to the present invention.

Fig. 5 is a perspective view showing a fabric for welding in another embodiment of the present invention.

Fig. 6A shows another embodiment of a fabric for welding according to the present invention.

Fig. 6B shows another embodiment of a fabric for welding according to the present invention.

Fig. 7A is a perspective view of one embodiment of the invention as a three-dimensional fabric for welding.

Fig. 7B is a perspective view of another embodiment of the invention as a three-dimensional fabric for welding.

Fig. 7C is a perspective view of another embodiment of the invention as a three-dimensional fabric for welding.

Fig. 8A is a perspective view of another embodiment of the invention as a three-dimensional fabric for welding.

Fig. 8B is a perspective view of another embodiment of the invention as a three-dimensional fabric for welding.

Fig. 8C is a perspective view of another embodiment of the invention as a three-dimensional fabric for welding.

Fig. 9A shows a conventional belt-form fabric for welding.

Fig. 9B illustrates how the fabric of Figure 9A is welded to a substrate.

DETAILED DESCRIPTION OF THE INVENTION

The fabric for welding according to the present invention can be any type of fabric, including woven or non-woven. The welding portion integral with the fabric can extend

either partially or completely over the width of the fabric. The welding portion of the fabric comprises at least a warp or a weft, or both, which melts under hot pressing to adhere the fabric to a substrate. The substrate may be any substrate which can be subjected to hot pressing, such as a cloth sheet, a synthetic resin sheet, or the like.

The fabric for welding can be in the form of a belt, sheet, or any form of fabric, woven or non-woven. Where the fabric is woven, any type of weave can be used. Examples of types of weaves, which examples are solely for purposes of illustration and are not intended to be limiting, are twill weave, satin weave, plain weave, and the like. Any type of weaving machine can be used to produce the fabric

The welding portion of the fabric can be any type of material which flows under hot pressing conditions to form a seal between the welding fabric and a substrate. The welding portion of the fabric may comprise warp or weft fibers coated with a thermoplastic synthetic resin, such as polyvinyl chloride, which melts under conditions of hot pressing to seal the fabric to a substrate. Alternatively, the warp or weft *per se* can be coated with a thermoplastic synthetic resin which melts under conditions of hot pressing to seal the fabric to a substrate.

Referring to Figure 1, the fabric for welding 1 is in the form of a belt which is twill-woven from warp 1a and weft 1b using a needle loom. In this embodiment, one side of the

fabric for welding is reinforced by chain-knitting an edge thread 1c.

The belt-form fabric for welding 1 is divided widthwise into a welding portion A and a fixing portion B. The warp 1a in the welding portion A is coated with a thermoplastic synthetic resin such as PVC. In this embodiment, only the warp 1a is coated. However, the weft 1b may also be coated, or may be coated instead of the warp 1a, as long as this coating does not adversely affect weaving of the fabric.

When the welding portion A of the fabric for welding 1 is overlapped on the fringe of a substrate S and hot-pressed, the thermoplastic resin around warp 1a melts and flows around between the substrate S and the welding portion A, adhering welding portion A securely to the surface of sheet 1. As a result, the fabric for welding 1 is perfectly welded with substrate S, thus rigidly uniting both members.

Any type of fiber can be used for warp 1a and weft 1b, including spun yarn, filament yarn, and textured yarn. The yarns can be made of any suitable material for making fabrics, including natural fibers, synthetic fibers, and blends thereof.

Where warp 1a comprises a multi-fiber assembly such as spun yarn, multi-filament yarn, or the like, some of the components of the yarn can be fibers coated with a thermoplastic synthetic resin or can be thermoplastic synthetic fibers per se. The weft 1b can also be composed in the same way as the warp 1a.

Figure 3A shows an embodiment of the present invention in which the fixing portion B of the fabric for welding 1 is provided with auxiliary fixing means. In Figure 3A, holes H are bored at a suitable interval in the fixing portion B in the fabric for welding 1 to facilitate fixing the unit to another unit or to a column, etc., using a rope or cord or similar device threaded through the holes.

Figure 3B provides another example of auxiliary fixing means in the fixing portion B of the fabric for welding 1 is provided with straps U, such as those disclosed by Unexamined Patent Publication H7-207-547.

In the above examples, a welding portion A is shown on one side of the fabric for welding 1. The welding portion A can be made on both sides of the fabric for welding 1 as shown in Figure 4A, or can be made the middle part of the fabric, as shown in Figure 4B. Also, auxiliary fixing means such as straps can also be provided where desired.

In the above examples, the fabric for welding 1 has been in the form of a belt. However, if necessary, the width of the belt can be broadened, and the fixing portion can be extended to that it may completely replace the substrate S. The fabric for welding with an extended fixing portion can be welded with another fabric for welding, as shown in Figure 5.

In the examples described so far, the fabric for welding 1 has been divided into a welding portion A and a fixing portion B. However, the entire portion of the fabric for welding 1 can be made as the welding portion A. Figure 6A

illustrates a fabric for welding in which an entire welding portion A is overlapped on the fringe of a substrate S. Optionally, holes (not illustrated) can be bored in this welding portion.

Figure 6B provides another example where the fabric for welding is connected with two substrates S.

Figures 7A-C illustrate some three-dimensionally woven fabrics for welding 1. Figure 7A shows an example where two welding portions A are branched from the middle line of a belt-form fixing portion B. Figure 7B shows an example where two welding portions A are each branched from a line just apart from the middle line of a fixing portion B. Figure 7C illustrates an examples wherein one welding portion A is branched from the middle line of belt-form fixing portion B.

Figure 8A-C illustrate other varieties of three-dimensional fabrics or welding 3. Figure 8A shows a case in which two welding portions A are branched from one edge of a belt-form fixing portion B. Figure 8B shows a case in which two fixing portions B are connected edge-to-edge with each other, and two welding portions A are branched therefrom. Figure 8C illustrates a case in which two fixing portions B are connected edge-to-edge with each other, and a single welding portion A is branched therefrom. The three-dimensional weaves in Figures 8B and 8C have the same basic construction as those shown in Figure 7A and Figure 7C, respectively, but they differ in the mode of the weave. The weave compositions of the three-dimensional

fabrics in Figures 7A-c and Figures 8A-C are described in detail in the specification of Japanese Patent Application H8-91782.

In a fabric for welding according to the present invention, the fabric has a welding portion and a fixing portion thereon. The welding portion uses at least a warp or a weft coated with a thermoplastic material, or a warp or a weft comprising a fiber coating with a thermoplastic material. Therefore, the fabric for welding of the present invention can be used for easy and perfect welding to substrates.

The foregoing description of the specific embodiments will so fully reveal the general nature of the invention that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without undue experimentation and without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. The means, materials, and steps for carrying out various disclosed functions may take a variety of alternative forms without departing from the invention.

Thus the expressions "means to..." and "means for...", or any method step language, as may be found in the specification above and/or in the claims below, followed by a functional statement, are intended to define and cover whatever

structural, physical, chemical or electrical element or structure, or whatever method step, which may now or in the future exist which carries out the recited function, whether or not precisely equivalent to the embodiment or embodiments disclosed in the specification above, i.e., other means or steps for carrying out the same function can be used; and it is intended that such expressions be given their broadest interpretation.

All patents and other references cited herein are hereby incorporated by reference in their entirety.

<u>Figure References</u>

1 fabric for welding

1a warp

1b weft

1c edge thread

2 fabric for welding

3 fabric for welding

A welding portion

B fixing portion

C coated part

H hole

S substrate

T belt-form fabric

t coarsely woven part

U strap